Existence and multiplicity of positive solutions for semipositone problems

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We discuss the existence and multiplicity of positive solutions for the following class of elliptic equations $\triangle u(x) + f(x, u(x)) + g(x)x \cdot \nabla u(x) = 0$, for $x \in \Omega_R = \{x \in \mathbb{R}^n, \|x\| > R\}$, $n > 2$. Our goal is to show that the problem possesses nondecreasing sequences of solutions u satisfying the following condition: there exist $B > A > 0$ and $L > 0$ such that for all $x \in \mathbb{R}^n$, $\|x\| > L$, $A\|x\|^{2-n} \leq u(x) \leq B\|x\|^{2-n}$. We consider also the case when $f(x, \cdot)$ is negative at the origin, so-called semipositone problem. In the proof of these results we apply the subsolution and supersolution method developed by Noussair and Swanson.

References

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